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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/903,764

07/13/2001

Taizo Oku

1463

30132

7590

06/08/2004

GEORGE A. LOUD

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EXAMINER

NGUYEN, KHIEM D

ART UNIT

PAPER NUMBER

2823

DATE MAILED: 06/08/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/903,764

Applicant(s)

OKU ET AL.

Examiner

Khiem D Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2004.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4,5 and 8-20 is/are pending in the application.
- 4a) Of the above claim(s) 9-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4,5,8,19 and 20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 042004. 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 4, 5, 8, 19, and 20 have been considered but are moot in view of the new ground(s) of rejection.

New Grounds of Rejection

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, 4, 5, 8, and 19 are rejected under 35 U.S.C. 102(a) as being anticipated by Junichi et al. (European Patent Application 1 174 915).

In re claims 1 and 19, **Junichi** discloses a film forming method for forming a silicon-containing barrier insulating film on a substrate comprising the steps of: forming wiring (**FIG. 11A: 23**) on a surface of a substrate; (a) preparing a film-forming gas comprising, (1) at least one member selected from the group consisting of siloxane compounds having Si-H bonds (col. 6, lines 15-36 and FIGS. 1-10) and (2) at least one oxygen-containing gas selected from the group consisting of O₂, N₂O, NO₂, CO, CO₂, and H₂O (col. 6, lines 18-23); (b) converting the film-forming gas into a plasma (col. 6, line 54 to col. 7, line 13); (c) contacting the substrate (**FIG. 11A: 21**) with the plasma to form the silicon-containing barrier insulating film (**FIG. 11A: 22**) on the substrate; and

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(d) forming a porous insulating film (**FIG. 12B: 25**) by plasma enhanced CVD or forming a SiOF film, as an interlayer insulating film directly on the barrier insulating film (col. 17, lines 18 to col. 18, line 21 and **FIGS. 11-16**).

In re claim 2, **Junichi** discloses wherein at least one member selected from a group consisting of N₂ and H₂ is added to the film-forming gas (col. 6, lines 37-53).

In re claim 4, **Junichi** discloses wherein (1) is tetraethoxysilane (TMDSO: (CH₃)₂HSi-O-SiH(CH₃)₂) (col. 6, lines 24-36).

In re claim 5, **Junichi** discloses wherein parallel-plate type electrodes are employed as a plasma generating means, and wherein high frequency power having a frequency of 100 kHz to 1MHz (col. 17, lines 5-17) is applied to an electrode on which the substrate is loaded and high frequency power having a frequency of 1 MHz or more is applied to an electrode opposing the electrode on which the substrate is loaded (col. 21, lines 9-17).

In re claim 8, **Junichi** discloses wherein the interlayer insulating film (**FIG. 12B: 25**) (having a thickness of 500 nm) has a greater thickness than the barrier insulating layer (having a thickness of 200 nm) (**FIG. 11A: 22**) (col. 17, line 18 to col. 18, line 57).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Junichi et al. (European Patent Application 1 174 915).

In re claim 20, there is no evidence indicating the N₂O/TMS volumetric ratio is critical and it has been held that it is not inventive to discover the optimum or workable range of a result-effective variable within given prior art conditions by routine experimentation. See MPEP §2144.05. Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising there from. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Response to Amendment

Response to Arguments

Applicant's arguments with respect to claims 1, 2, 4, 5, 8, 19, and 20 have been considered but are moot in view of the new ground(s) of rejection.

Applicants contend that the only silicon-containing reactants disclosed or suggested by the reference Takeda et al. (U.S. Pub. 2003/0111730) herein known as Takeda are alkoxy silanes represented by the general formula (RO)_nSiH_{4-n}.

In response to Applicants contention that the alkoxy silanes of Takeda et al. contain no siloxane group, examiner respectfully disagree. Since Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. The newly discovered reference Junichi et al. (European Patent Application 1 174 915) discloses a

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film forming method for forming a silicon-containing barrier insulating film on a substrate comprising the steps of: forming wiring (**FIG. 11A: 23**) on a surface of a substrate; (a) preparing a film-forming gas comprising, (1) at least one member selected from the group consisting of siloxane compounds having Si-H bonds (col. 6, lines 15-36 and **FIGS. 1-10**) and (2) at least one oxygen-containing gas selected from the group consisting of O₂, N₂O, NO₂, CO, CO₂, and H₂O (col. 6, lines 18-23); (b) converting the film-forming gas into a plasma (col. 6, line 54 to col. 7, line 13); (c) contacting the substrate (**FIG. 11A: 21**) with the plasma to form the silicon-containing barrier insulating film (**FIG. 11A: 22**) on the substrate; and (d) forming a porous insulating film (**FIG. 12B: 25**) by plasma enhanced CVD or forming a SiOF film, as an interlayer insulating film directly on the barrier insulating film (col. 17, lines 18 to col. 18, line 21 and **FIGS. 11-16**). Therefore, Applicants' argument is moot.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any

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extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Khiem D Nguyen whose telephone number is (571) 272-1865. The examiner can normally be reached on Monday-Friday (8:00 AM - 5:00 PM).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (571) 272-1855. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 305-3432 for regular communications and (703) 305-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

K.N.
June 3, 2004



W. DAVID COLEMAN
PRIMARY EXAMINER